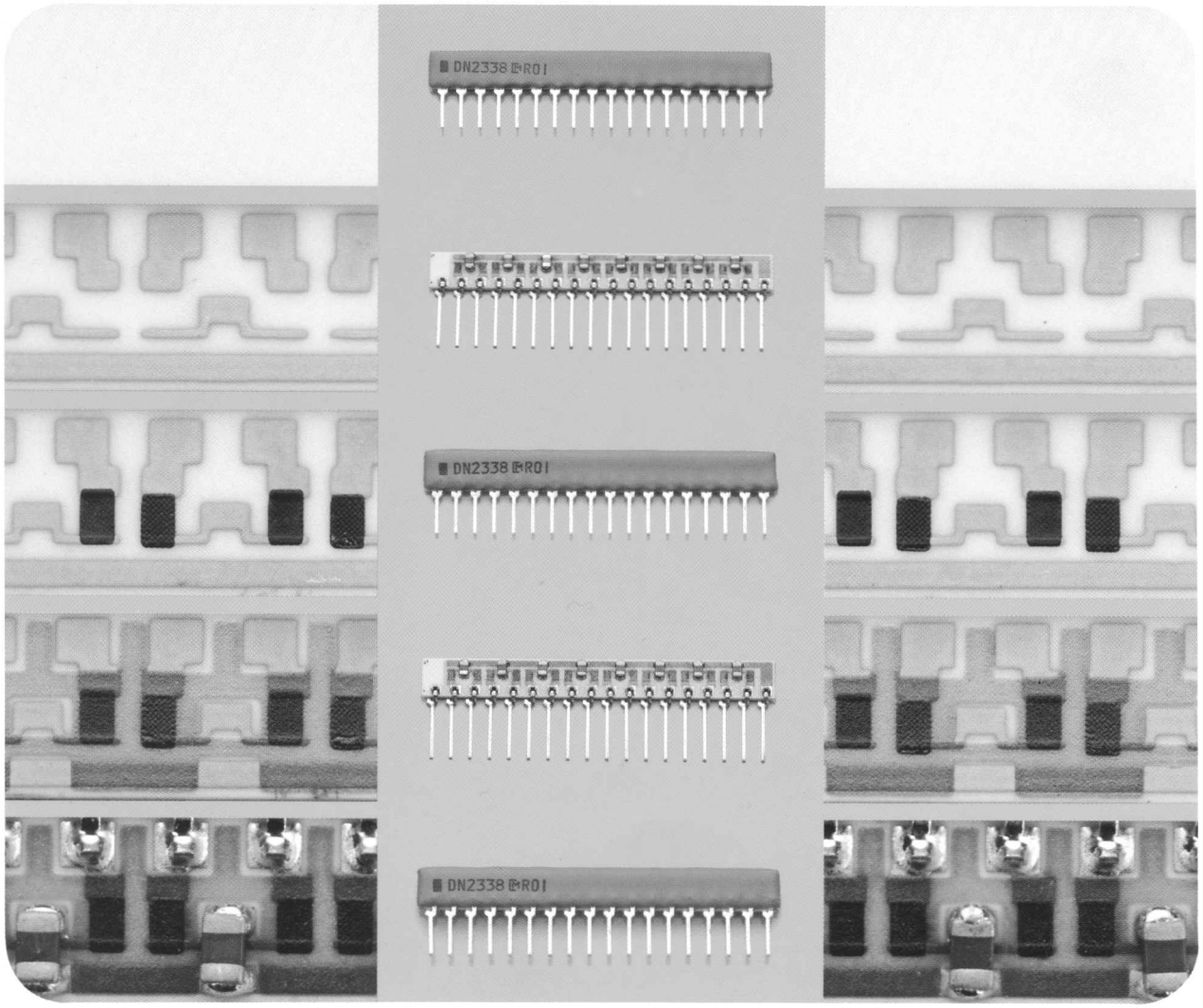
RESISTOR, CAPACITOR, AND RESISTOR-CAPACITOR

NETWORKS/ MODULES

CATALOG NO. R-01-C



muRata ERIE®

MURATA ERIE NORTH AMERICA

Murata Erie's resistor, capacitor and resistor-capacitor networks are backed by over 35 years of experience in the manufacture of electronic components with one of the world's most automated production facilities. The Murata Erie components described in this catalog can be counted on to provide the highest degree of reliability and component-to-component consistency in performance.

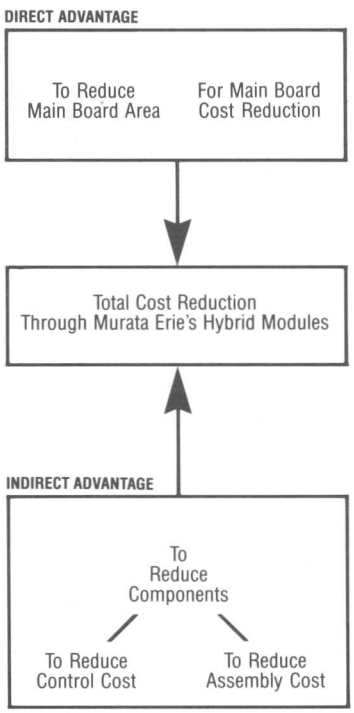
All of these devices shown are considered standard. However, to meet custom requirements and specifications, Murata Erie application engineers are available to provide technical assistance and guidance.

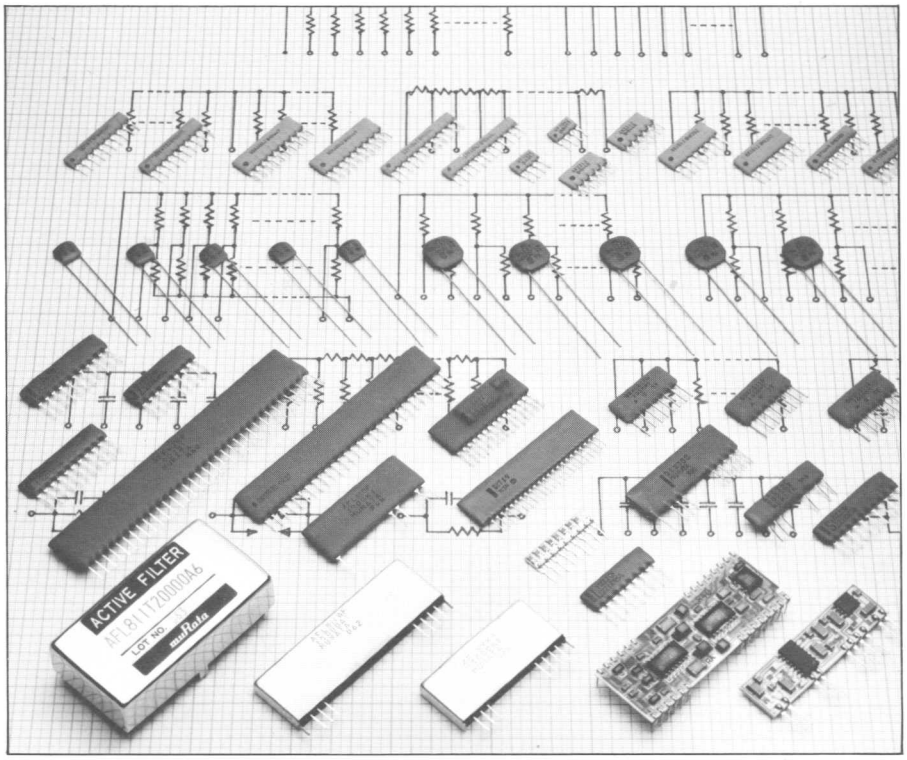
IECQ Certification

On November 27, 1984, Murata Erie's R-Networks were awarded the quality certification by the International Electrotechnical Commission Quality Assessment System for Electronic Components (IECQ). This is the first such certification in the world for R-Networks.

This certification of quality will enable Murata Erie's R-Networks to be received without inspection, will contribute greatly to guaranteeing user satisfaction and cutting costs and will, thus enable export to countries around the world that participate in the IECQ, especially to the United States and to Europe.

THE ADVANTAGES OF MODULES





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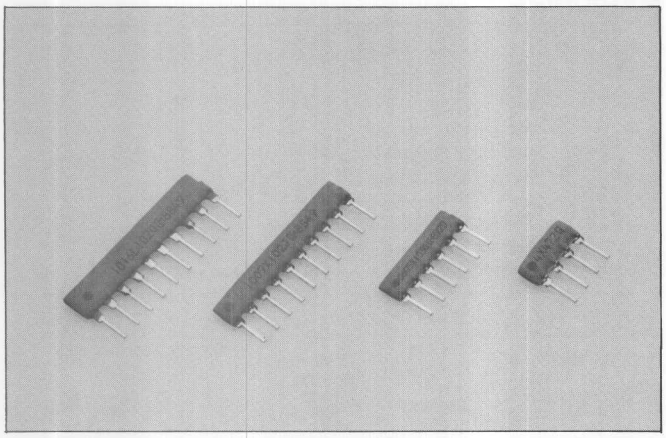
RESISTOR NETWORKS



Murata Erie's thick film resistor networks are designed to meet a variety of application requirements in a compact, highly reliable package. Considerable production economies are also realized during board assembly since only one component, consisting of many resistors, has to be inserted in the PC board. Moreover, it is possible to assemble resistor networks consecutively with .10 inch pitch mounting holes. Our RSL series is also compatible with all standard DIP package heights with a maximum seated height of just .200".

Quality is monitored and controlled in accordance with TQC (Total Quality Concepts) inspection. The AQL is .25% for value and tolerance at 25°C and visual marking (major) attributes. Dimension is .65% AQL and general workmanship is 2.5% AQL.

Murata Erie welcomes the opportunity to aid in the design of resistor network modules to meet specific requirements within the overall capabilities described in this catalog.

ELECTRICAL SPECIFICATIONS

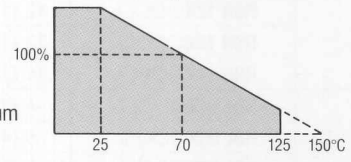
Temperature Range: −55°C to +125°C
Resistance Range: 22Ω to 1MΩ
Resistance Tolerance: ±5% (10Ω to 1MΩ)
±2% (22Ω to 1MΩ)
±1% (68Ω to 220KΩ)
Temperature Coefficient: ±200ppm/°C (±100ppm/°C on special order)
Power Rating: 100% at 70°C
Maximum ambient temp. at 0 watt is 125°C
Voltage Rating: $E = \sqrt{PR}$
E = Voltage rating
P = Power rating
R = Ohmic value
However, not to exceed each maximum working voltage

E 24 Values

10	15	22	33	47	68
11	16	24	36	51	75
12	18	27	39	56	82
13	20	30	43	62	91

Example: 110Ω, 1.1KΩ, 110KΩ

Power Derating Characteristics:



MECHANICAL SPECIFICATIONS

Substrate Material: Alumina
Resistor Material: Cermet
Lead Pull Strength: 2 lbs.
Coating: Meets UL94V-0 Standards

APPLICATIONS

Consumer	For digital circuits in color television sets, video related devices, car radios, electronic ovens, air conditioners, etc.
Industrial	For digital circuits such as computers and terminals, micro computers, office automation equipment (ECR, copy machine, facsimiles, etc.)

PART NUMBERING SYSTEM

RS L 08 X 103 J - □□

Thick film resistor network

Construction (Refer to the table below)

	Height Dim.: in/mm	Remarks
RSL	.200/5.0 max.	Low Profile
RSC	.197/5.0 max.	Medium Profile
RSH	.355/9.0 max.	High Profile

Number of pins 4 thru 14 pin STD.

Circuit type

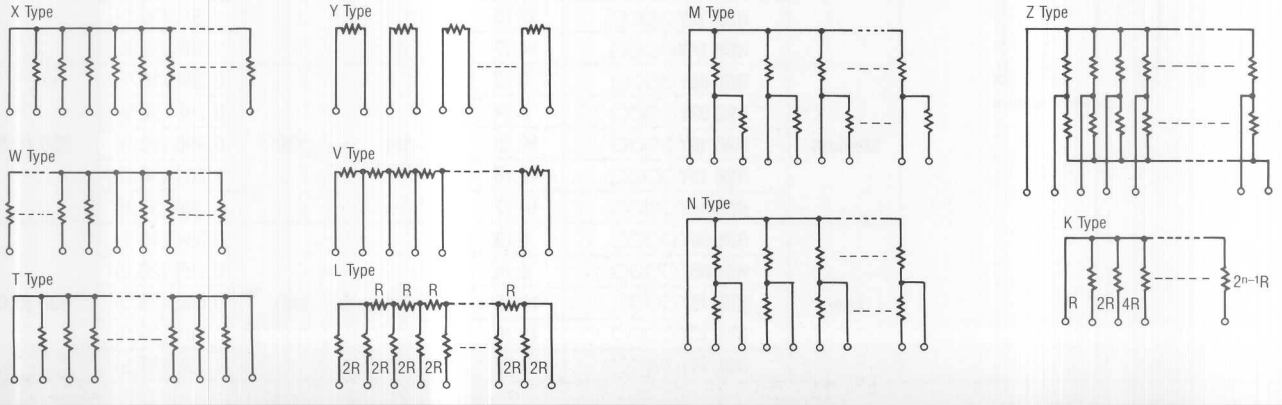
Nominal resistance value: The first two digits indicate significant figures and last digit indicates number of zeros that follow (Unit: ohms)

Resistance tolerance
F: ±1%
G: ±2%
J: ±5%

Other specifications

AVAILABLE CIRCUITS

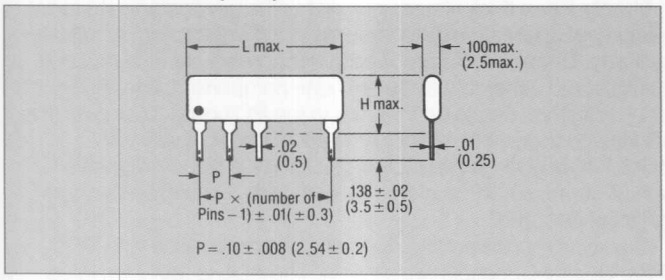
Custom R-Networks are also available. Contact Murata Erie.



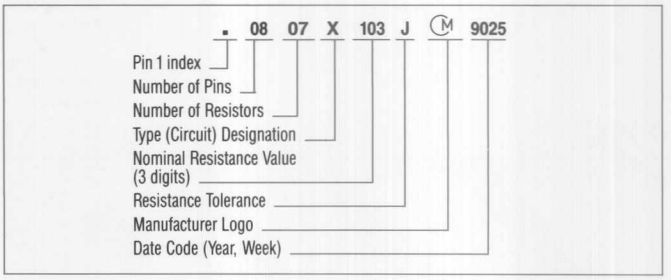
SIP
RESISTOR NETWORKS

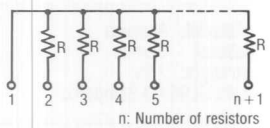
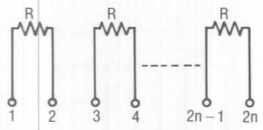
X and Y Types

DIMENSIONS in. (mm)



MARKINGS



	Profile	Part Number ○○○Nominal Resistance Value □Resistance Tolerance	Number of Pins (Number of Resistors)	Power Ratings Each Resistor (W)	Max. Operating Voltage (V)	Dimensions: in. (mm) L	Dimensions: in. (mm) H
COMMON CIRCUIT 4 through 14 PINS							
X Type 	High	**RSH 04X○○○□**	4 (3)	1/4	100	0.398 (10.1)	.355 (9.0)
		RSH 05X○○○□	5 (4)			0.496 (12.6)	
		RSH 06X○○○□	6 (5)			0.594 (15.1)	
		RSH 07X○○○□	7 (6)			0.693 (17.6)	
		RSH 08X○○○□	8 (7)			0.795 (20.2)	
		RSH 09X○○○□	9 (8)			0.894 (22.7)	
		RSH 10X○○○□	10 (9)			0.996 (25.3)	
		RSH 11X○○○□	11 (10)			1.094 (27.8)	
		RSH 12X○○○□	12 (11)			1.201 (30.5)	
		RSH 13X○○○□	13 (12)			1.299 (33.0)	
		RSH 14X○○○□	14 (13)			1.398 (35.5)	
	Low	**RSL 04X○○○□**	4 (3)	1/8	100	0.398 (10.1)	.200 (5.0)
		RSL 05X○○○□	5 (4)			0.496 (12.6)	
		RSL 06X○○○□	6 (5)			0.594 (15.1)	
		RSL 07X○○○□	7 (6)			0.693 (17.6)	
		RSL 08X○○○□	8 (7)			0.795 (20.2)	
		RSL 09X○○○□	9 (8)			0.894 (22.7)	
		RSL 10X○○○□	10 (9)			0.996 (25.3)	
		RSL 11X○○○□	11 (10)			1.094 (27.8)	
		RSL 12X○○○□	12 (11)			1.201 (30.5)	
		RSL 13X○○○□	13 (12)			1.299 (33.0)	
		RSL 14X○○○□	14 (13)			1.398 (35.5)	
ISOLATED CIRCUIT 6, 8, 10, 12, AND 14 PINS							
Y Type 	High	**RSH 06Y○○○□**	6 (3)	1/2	100	0.594 (15.1)	.355 (9.0)
		RSH 08Y○○○□	8 (4)			0.795 (20.2)	
		RSH 10Y○○○□	10 (5)			0.996 (25.3)	
		RSH 12Y○○○□	12 (6)			1.201 (30.5)	
		RSH 14Y○○○□	14 (7)			1.398 (35.5)	
	Medium	**RSC 06Y○○○□**	6 (3)	1/4	100	0.594 (15.1)	.256 (6.5)
		RSC 08Y○○○□	8 (4)			0.795 (20.2)	
		RSC 10Y○○○□	10 (5)			0.996 (25.3)	
		RSC 12Y○○○□	12 (6)			1.201 (30.5)	
		RSC 14Y○○○□	14 (7)			1.398 (35.5)	
	Low	**RSL 06Y○○○□**	6 (3)	1/8	100	0.594 (15.1)	.200 (5.0)
		RSL 08Y○○○□	8 (4)			0.795 (20.2)	
		RSL 10Y○○○□	10 (5)			0.996 (25.3)	
		RSL 12Y○○○□	12 (6)			1.201 (30.5)	
		RSL 14Y○○○□	14 (7)			1.398 (35.5)	

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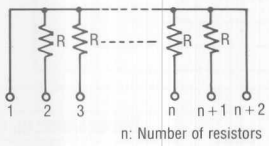
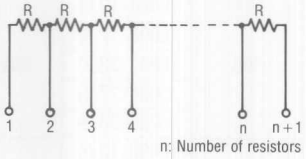
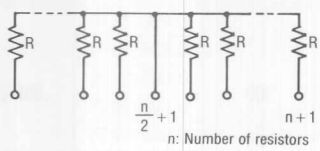
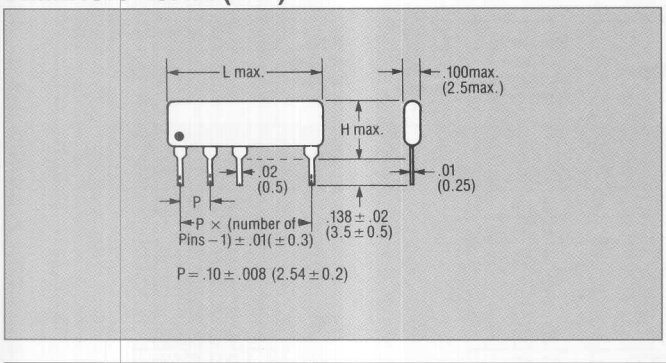
T, V and W Types

	Profile	Part Number* ○○○ Nominal Resistance Value □Resistance Tolerance	Number of Pins (Number of Resistors)	Power Ratings Each Resistor (W)	Max. Operating Voltage (V)	Dimensions: in. (mm) L	Dimensions: in. (mm) H
FIRST PIN, LAST PIN COMMON 5 through 14 PINS							
T Type  n: Number of resistors	High	**RSH 05T○○○□**	5 (3)	1/4	100	0.496 (12.6)	.355 (9.0)
		RSH 06T○○○□	6 (4)			0.594 (15.1)	
		RSH 07T○○○□	7 (5)			0.693 (17.6)	
		RSH 08T○○○□	8 (6)			0.795 (20.2)	
		RSH 09T○○○□	9 (7)			0.894 (22.7)	
		RSH 10T○○○□	10 (8)			0.996 (25.3)	
		RSH 11T○○○□	11 (9)			1.094 (27.8)	
		RSH 12T○○○□	12 (10)			1.201 (30.5)	
		RSH 13T○○○□	13 (11)			1.299 (33.0)	
		RSH 14T○○○□	14 (12)			1.398 (35.5)	
	Low	**RSL 05T○○○□**	5 (3)	1/8	100	0.496 (12.6)	.200 (5.0)
		RSL 06T○○○□	6 (4)			0.594 (15.1)	
		RSL 07T○○○□	7 (5)			0.693 (17.6)	
		RSL 08T○○○□	8 (6)			0.795 (20.2)	
		RSL 09T○○○□	9 (7)			0.894 (22.7)	
		RSL 10T○○○□	10 (8)			0.996 (25.3)	
		RSL 11T○○○□	11 (9)			1.094 (27.8)	
		RSL 12T○○○□	12 (10)			1.201 (30.5)	
		RSL 13T○○○□	13 (11)			1.299 (33.0)	
		RSL 14T○○○□	14 (12)			1.398 (35.5)	
SERIES CIRCUIT 4 through 14 PINS							
V Type  n: Number of resistors	High	**RSH 04V○○○□**	4 (3)	1/4	100	0.398 (10.1)	.355 (9.0)
		RSH 05V○○○□	5 (4)			0.496 (12.6)	
		RSH 06V○○○□	6 (5)			0.594 (15.1)	
		RSH 07V○○○□	7 (6)			0.693 (17.6)	
		RSH 08V○○○□	8 (7)			0.795 (20.2)	
		RSH 09V○○○□	9 (8)			0.894 (22.7)	
		RSH 10V○○○□	10 (9)			0.996 (25.3)	
		RSH 11V○○○□	11 (10)			1.094 (27.8)	
		RSH 12V○○○□	12 (11)			1.201 (30.5)	
		RSH 13V○○○□	13 (12)			1.299 (33.0)	
		RSH 14Y○○○□	14 (13)			1.398 (35.5)	
	Low	**RSL 04V○○○□**	4 (3)	1/8	100	0.398 (10.1)	.200 (5.0)
		RSL 05V○○○□	5 (4)			0.496 (12.6)	
		RSL 06V○○○□	6 (5)			0.594 (15.1)	
		RSL 07V○○○□	7 (6)			0.693 (17.6)	
		RSL 08V○○○□	8 (7)			0.795 (20.2)	
		RSL 09V○○○□	9 (8)			0.894 (22.7)	
		RSL 10V○○○□	10 (9)			0.996 (25.3)	
		RSL 11V○○○□	11 (10)			1.094 (27.8)	
		RSL 12V○○○□	12 (11)			1.201 (30.5)	
		RSL 13V○○○□	13 (12)			1.299 (33.0)	
		RSL 14V○○○□	14 (13)			1.398 (35.5)	
PIN CENTER COMMON 5, 7, 9, 11, AND 13 PINS							
W Type  n: Number of resistors	High	**RSH 05W○○○□**	5 (4)	1/4	100	0.496 (12.6)	.355 (9.0)
		RSH 07W○○○□	7 (6)			0.693 (17.6)	
		RSH 09W○○○□	9 (8)			0.894 (22.7)	
		RSH 11W○○○□	11 (10)			1.094 (27.8)	
		RSH 13W○○○□	13 (12)			1.299 (33.0)	
	Low	**RSL 05W○○○□**	5 (4)	1/8	100	0.496 (12.6)	.200 (5.0)
		RSL 07W○○○□	7 (6)			0.693 (17.6)	
		RSL 09W○○○□	9 (8)			0.894 (22.7)	
		RSL 11W○○○□	11 (10)			1.094 (27.8)	
		RSL 13W○○○□	13 (12)			1.299 (33.0)	

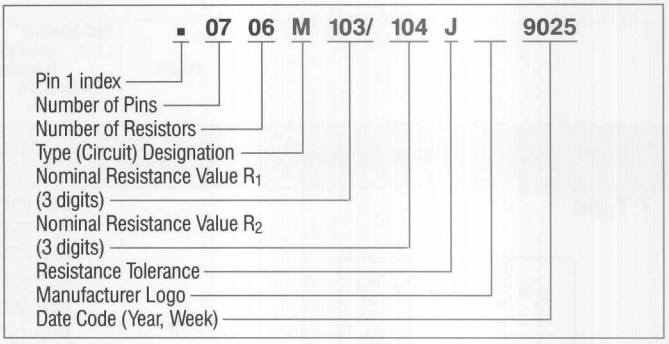
SIP
RESISTOR NETWORKS

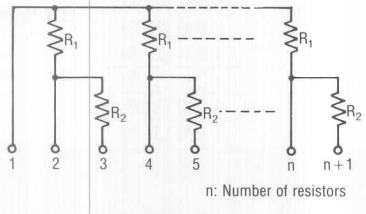
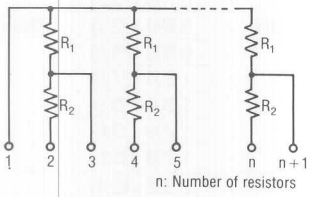
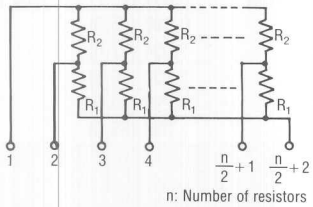
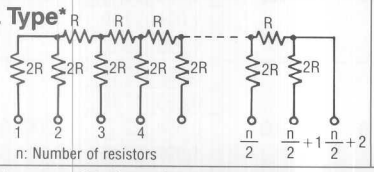
M, N, Z and L Types

DIMENSIONS: in. (mm)



MARKINGS



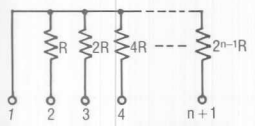
	Profile	Part Number* ○○○ Nominal △△△ Resistance Value □ Resistance Tolerance	Number of Pins (Number of Resistors)	Power Ratings Each Resistor (W)	Max. Operating Voltage (V)	Dimensions: in. (mm) L	Dimensions: in. (mm) H
EVEN PIN VOLTAGE DIVIDER 5, 7, 9, 11, AND 13 PINS							
M Type  n: Number of resistors	High	**RSH 05M○○○/△△△□**	5 (4)	1/4	100	0.496 (12.6)	.355 (9.0)
		RSH 07M○○○/△△△□	7 (6)			0.693 (17.6)	
		RSH 09M○○○/△△△□	9 (8)			0.894 (22.7)	
		RSH 11M○○○/△△△□	11 (10)			1.094 (27.8)	
		RSH 13M○○○/△△△□	13 (12)			1.299 (33.0)	
	Low	**RSL 05M○○○/△△△□**	5 (4)	1/8	100	0.496 (12.6)	.200 (5.0)
		RSL 07M○○○/△△△□	7 (6)			0.693 (17.6)	
		RSL 09M○○○/△△△□	9 (8)			0.894 (22.7)	
		RSL 11M○○○/△△△□	11 (10)			1.094 (27.8)	
		RSL 13M○○○/△△△□	13 (12)			1.299 (33.0)	
ODD PIN VOLTAGE DIVIDER 5, 7, 9, 11, AND 13 PINS							
N Type  n: Number of resistors	High	**RSH 05N○○○/△△△□**	5 (4)	1/4	100	0.496 (12.6)	.355 (9.0)
		RSH 07N○○○/△△△□	7 (6)			0.693 (17.6)	
		RSH 09N○○○/△△△□	9 (8)			0.894 (22.7)	
		RSH 11N○○○/△△△□	11 (10)			1.094 (27.8)	
		RSH 13N○○○/△△△□	13 (12)			1.299 (33.0)	
	Low	**RSL 05N○○○/△△△□**	5 (4)	1/8	100	0.496 (12.6)	.200 (5.0)
		RSL 07N○○○/△△△□	7 (6)			0.693 (17.6)	
		RSL 09N○○○/△△△□	9 (8)			0.894 (22.7)	
		RSL 11N○○○/△△△□	11 (10)			1.094 (27.8)	
		RSL 13N○○○/△△△□	13 (12)			1.299 (33.0)	
DUAL TERMINATOR CIRCUIT 6 through 10 PINS							
Z Type  n: Number of resistors	High	**RSH 06Z○○○/△△△□**	6 (8)	1/4	100	0.594 (15.1)	.355 (9.0)
		RSH 07Z○○○/△△△□	7 (10)			0.693 (17.6)	
		RSH 08Z○○○/△△△□	8 (12)			0.795 (20.2)	
		RSH 09Z○○○/△△△□	9 (14)			0.894 (22.7)	
		RSH 10Z○○○/△△△□	10 (16)			0.996 (25.3)	
	Low	**RSL 06Z○○○/△△△□**	6 (8)	1/8	100	0.594 (15.1)	.200 (5.0)
		RSL 07Z○○○/△△△□	7 (10)			0.693 (17.6)	
		RSL 08Z○○○/△△△□	8 (12)			0.795 (20.2)	
		RSL 09Z○○○/△△△□	9 (14)			0.894 (22.7)	
		RSL 10Z○○○/△△△□	10 (16)			0.996 (25.3)	
LADDER CIRCUIT (R/2R) 5 through 10 PINS							
L Type*  n: Number of resistors	Medium	**RSC 05L○○○G**	5 (6)	1/32	100	0.496 (12.6)	.256 (6.5)
		RSC 06L○○○G	6 (8)			0.594 (15.1)	
		RSC 07L○○○G	7 (10)			0.693 (17.6)	
		RSC 08L○○○G	8 (12)			0.795 (20.2)	
		RSC 09L○○○G	9 (14)			0.894 (22.7)	
		RSC 10L○○○G	10 (16)			0.996 (25.3)	

*Besides normal Resistor characteristics, linearity within ±½ LSB is guaranteed. *○○○ = R_1, △△△ = R_2 *Max. "R" value is 100kΩ. Tolerance of resistance is only G(±2%).

SIP
RESISTOR NETWORKS

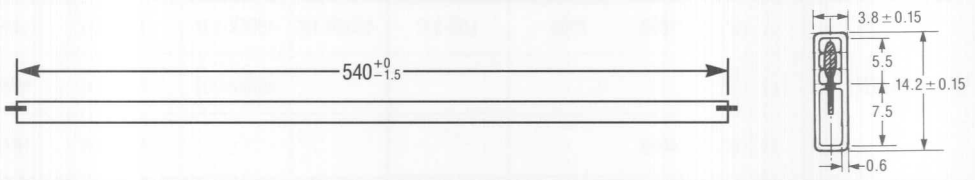
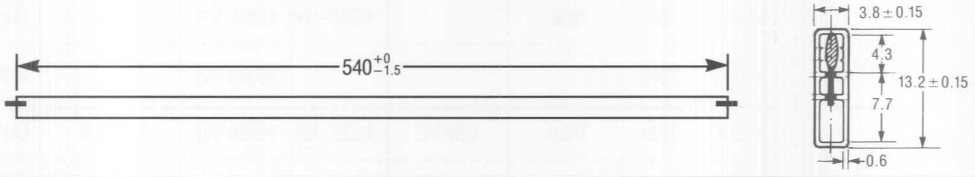
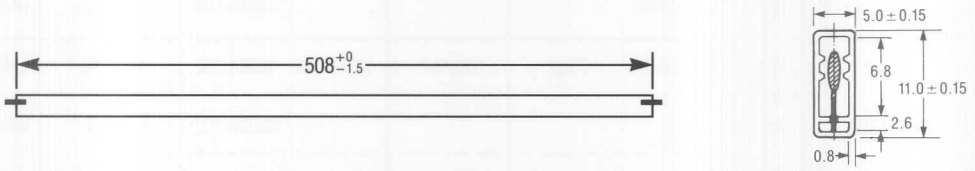
muRata ERIE

K Types

	Profile	Part Number* ○○○ Nominal Resistance Value □ Resistance Tolerance	Number of Pins (Number of Resistors)	Power Ratings Each Resistor (W)	Max. Operating Voltage (V)	Dimensions: in. (mm) L	Dimensions: in. (mm) H
2^{n-1}R CIRCUIT 5, 6, AND 7 PINS							
K Type  n: Number of resistors Max resistance in the circuit is 1MΩ.	Low	**RSL 05K**○○○□	5 (4)	1/16	100	0.496 (12.6)	.197 (5.0)
		RSL 06K○○○□	6 (5)			0.594 (15.1)	
		RSL 07K○○○□	7 (6)			0.693 (17.6)	

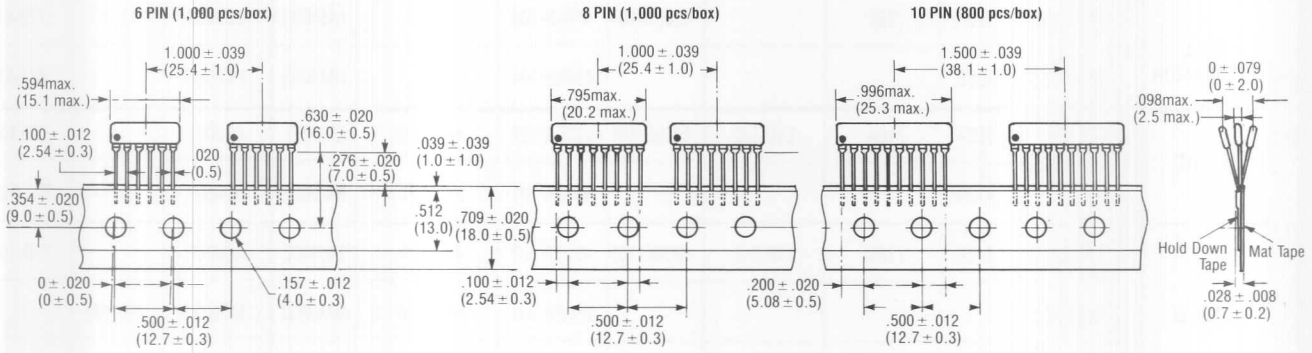
NETWORK PACKAGING

MAGAZINE (TUBE)

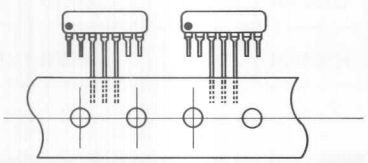
Applied Series	Magazine Code	Dimensions: mm
RSC	M01	
RSL	M02	
RSL	M05	

TAPE

DIMENSIONS: in. (mm)



3 PIN TAPING



3 pin taping is available for parts with 4 pins to 9 pins. Contact Murata Erie Product Engineering for full specifications. Tel (404) 436-1300.

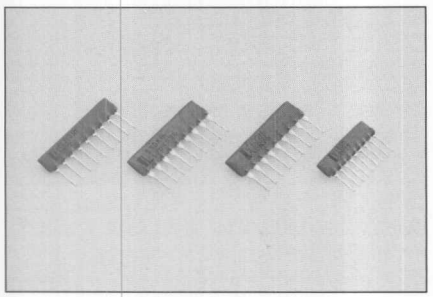
SIP RESISTOR NETWORKS
PART NUMBERING CROSS REFERENCES

		MURATA ERIE①	ALLEN BRADLEY①③		BECKMAN①③	BOURNES①③		CENTRALAB①③	CORNING①③		CTS②③	
		CONFORMAL	MOLDED	CONFORMAL	CONFORMAL	MOLDED	CONFORMAL	CONFORMAL/FILM	MOLDED	CONFORMAL	RECTANGLE	CONFORMAL
6 PINS	BUSSED	RSL 06X	106A	706A	L06-1-C	4306R-101	4606X-101	HF21-06	LM6001	LC6001		770-61-R
		RSH 06X	406A				4606H-101	HC31-06	HM6001	HC6001		771-61-R
	ISOLATED	RSL 06Y	106B	706B	L06-3-C	4306R-102	4606X-102	HF22-06	LM6002	LC6002		770-63-R
		RSC 06Y					4606M-102	HC22-06	MM6002	MC6002	750-63	
		RSC 06Y*	406B					HC32-06	HM6002	HC6002		771-63-R
	DUAL TERMINATOR	RSL 06Z	106E	706E		4306R-104	4606X-104		LM6003	LC6003		770-65-R
		RSH 06Z	406E				4606H-104		HM6003	HC6003		771-65-R
8 PINS	BUSSED	RSL 08X	108A	708A	L08-1-C	4308R-101	4608X-101	HF21-08	LM8001	LC8001		770-81-R
		RSH 08X	408A				4608H-101	HC31-08	HM8001	HC8001		771-81-R
	ISOLATED	RSL 08Y	108B	708B	L08-3-C	4308R-102	4608X-102	HF22-08	LM8002	LC8002		770-83-R
		RSC 08Y					4608M-102	HC22-08	MM8002	MC8002	750-83	
		RSC 08Y*	408B					HC32-08	HM8002	HC8002		771-83-R
	DUAL TERMINATOR	RSL 08Z	108E	708E		4308R-104	4608X-104		LM8003	LC8003		770-85-R
		RSH 08Z	408E				4608H-104		HM8003	HC8003		771-85-R
10 PINS	BUSSED	RSL10X	110A	710A	L10-1-C	4310R-101	4610X-101	HF21-10	LM0001	LC0001		770-101-R
		RSH10X	410A				4610H-101	HC31-10	HM0001	HC0001		771-101-R
	ISOLATED	RSL10Y	110B	710B	L10-3-C	4310R-102	4610X-102	HF22-10	LM0002	LC0002		770-103-R
		RSC10Y					4610M-102	HC22-10	MM0002	MC0002	750-103	
		RSC10Y*	410B					HC32-10	HM0002	HC0002		771-103-R
	DUAL TERMINATOR	RSL10Z	110E	710E		4310R-104	4610X-104		LM0003	LC0003		770-105-R
		RSH10Z	410E				4610H-104		HM0003	HC0003		771-105-R

* RSCY Series is medium profile but ¼ watt power rating.
①Uses EIA Code for designation of resistance value.
②Uses actual ohmic value for designation of resistance value.
③Only 2% (G) tolerance standard for bussed and isolated circuits.

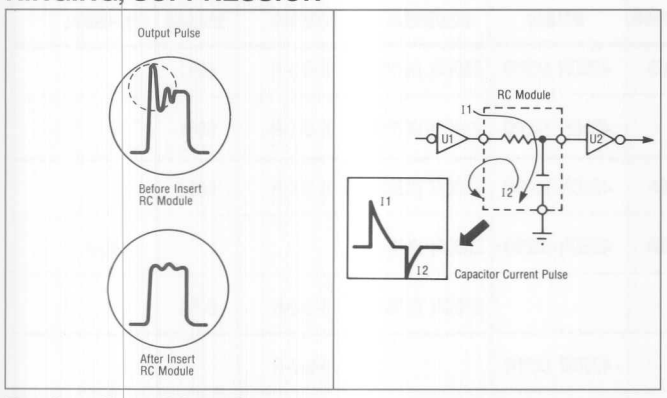
DALE①③		KYOCERA①③	MEPCO①③	PANASONIC①③	R-OHM①③		SPRAGUE①③		STACKPOLE①③	TRW①③	
MOLDED	CONFORMAL	CONFORMAL	MOLDED	CONFORMAL	MOLDED	CONFORMAL	MOLDED	CONFORMAL	COATING	MOLDED	CONFORMAL
MSP06A01	CSC06A01	SRNSA6P	9S06( )002	EXB-EQ5	RPL6S	RKL6S	420CF( )X2PD	210CF( )X2PD	6-5-5-R	6061	
MSP06C01	CSC06C01	RNSA6P			RPH6S		435CF( )X2PD	216CF( )X2PD	6-5-1-R	8061	
MSP06A03	CSC06A03	SRNSB6P	9S06( )001	EXB-VS3	RPL6A	RKL6A	420CF( )X2SR	210CF( )X2SR	6-3-6-R	6063	
		MRNSB6P				RKM6A	425CF( )X2SR	256CF( )X2SR			C06-3
MSP06C03	CSC06C03	RNSB6P			RPH6A			216CF( )X2SR	6-3-2-R	8063	
MSP06A05	CSC06A05	SRNSF6P	9S06( )	EXB-WQ4			420CF( )X2TR		6-8-7-R		
MSP06C05	CSC06C05	RNSF6P			RPH6B		435CF( )X2TR	216CF( )X2TR	6-8-3-R		
MSP08A01	CSC08A01	SRNSA8P	9S08( )002	EXB-EQ7	RPL8S	RKL8S	420CH( )X2PD	210CH( )X2PD	8-7-5-R	6081	
MSP08C01	CSC08C01	RNSA8P			RPH8S		435CH( )X2PD	216CH( )X2PD	8-7-1-R	8081	
MSP08A03	CSC08A03	SRNSB8P	9S08( )001	EXB-VS4	RPL8A	RKL8A	420CH( )X2SR	210CH( )X2SR	8-4-6-E	6083	
		MRNSB8P				RKM8A	425CH( )X2SR	256CH( )X2SR			C08-3
MSP08C03	CSC08C03	RNSB8P			RPH8A			216CH( )X2SR	8-4-2-R	8083	
MSP08A05	CSC08A05	SRNSF8P	9S08( )	EXB-WQ6			420CH( )X2TR		8-12-7-R		
MSP08C05	CSC08C05	RNSF8P			RPH8B		435CH( )X2TR	216CH( )X2TR	8-12-3-R		
MSP10A01	CSC10A01	SRNSA10P	9S10( )002	EXB-EQ9	RPL10S	RKL10S	420CK( )X2PD	210CK( )X2PD	10-9-5-R	6101	
MSP10C01	CSC10C01	RNSA10P			RPH10S		435CK( )X2PD	216CK( )X2PD	10-9-1-R	8101	
MSP10A03	CSC10A03	SRNSB10P	9S10( )001	EXB-VS5	RPL10A	RKL10A	420CK( )X2SR	210CK( )X2SR	10-5-6-R	6103	
		MRNSB10P				RKM10A	425CK( )X2SR	256CK( )X2SR			C10-3
MSP10C03	CSC10C03	RNSB10P			RPH10A			216CK( )X2SR	10-5-2-R	8103	
MSP10A05	CSC10A05	SRNSF10P	9S10( )	EXB-WQ8			420CK( )X2TR		10-16-7-R		
MSP10C05	CSC10C05	RNSF10P			RHP10B		435CK( )X2TR	216CK( )X2TR	10-16-3-R		

RC MODULES FOR EMI/RFI AND NOISE SUPPRESSION



Murata Erie Capacitor and Resistor/Capacitor Modules are designed to provide superior noise suppression performance in all types of applications. They incorporate Murata Erie manufactured substrates and ceramic monolithic capacitors that are produced under the Company's strict quality control procedures from the raw ceramic powder to the finished product. The monolithic ceramic capacitors incorporated in these modules feature excellent high frequency performance because of low ESR's and high Q's. Temperature performance is exceptionally reliable and in complete conformance to specifications for both the resistor and capacitor elements of these modules. These compact modules can help to reduce board space and assembly time, while increasing the quality of the design.

RINGING, SUPPRESSION



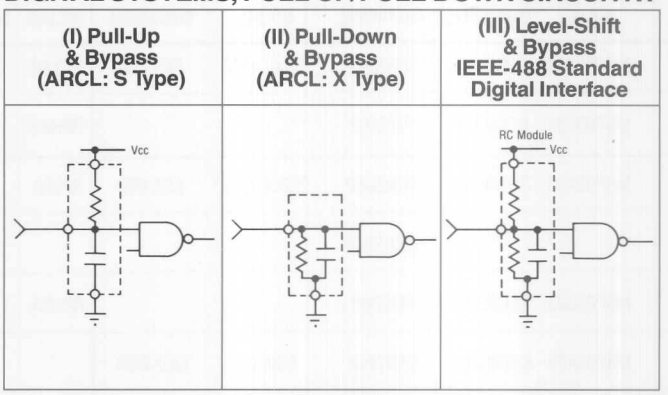
Design Considerations

In all circuits, care should be taken to utilize the amount of capacitance necessary to gain the desired results. If too much capacitance is used, crosstalk can result.

TTL—When Rise time is over 1μ sec. (duty 50%= 2.2CR), micro-noise is amplified in the vicinity of threshold voltage and oscillation can occur. A maximum resistance of 200 ohms and a maximum capacitance of 1,000 pF is recommended.

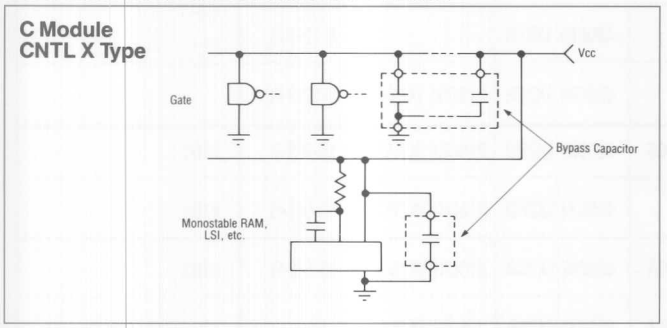
C-MOS—If capacitor is used in either the input or output circuit without a protective resistor, the C-MOS module may be destroyed by the resulting current spike. An integrating or differentiating circuit should be used for the coupling function.

DIGITAL SYSTEMS, PULL-UP/PULL-DOWN CIRCUITRY



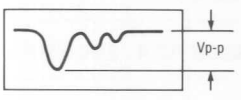
Even though the data signal is raised above the noise level with a pull-up resistor, there are some cases where high frequency noise can be picked up from interconnecting wiring and cabling. This type of high frequency noise can be eliminated by utilizing an RC module that incorporates capacitors with good high frequency characteristics in values from 22 pF to 470 pF.

POWER SUPPLY BYPASS SYSTEMS



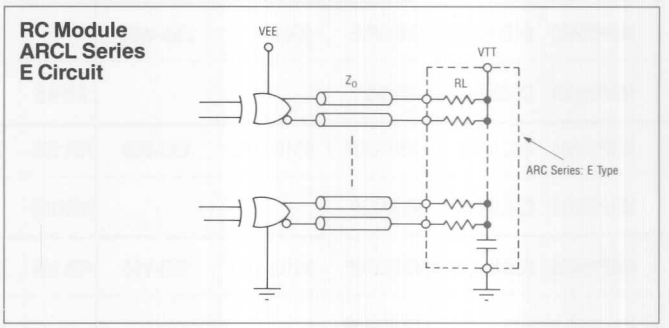
In many cases, the tolerance of digital I.C.'s to power supply noise is not high. Therefore, it is necessary to utilize bypass capacitors in the range of 0.047μF to 0.1μF on all power supply lines as close to the I.C. as possible.

Gate Circuits—To determine the appropriate capacitance, connect an oscilloscope (in the AC mode) to the V_{CC} line. Typical suppression capacitor requirements will be approximately one for every 100 to 200 mV p-p of noise.



Monostable RAM—One capacitor per RAM package is required across the V_{CC} line.

HIGH SPEED LOGIC RINGING SUPPRESSION IN ECL CIRCUITS



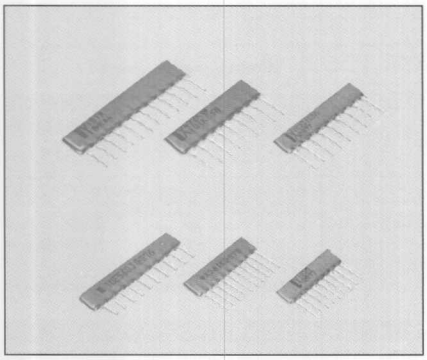
Because of the reduced noise tolerance of ECL (Emitter Coupled Logic) circuitry (typically 250 mV max.) and their high speed of operation, that impedance matching becomes a major consideration in the design process. Mis-matched transmission lines are extremely susceptible to external noise sources and can also create electrical noise. Another area that requires close attention during the design process is solid grounding throughout the system.

Murata Erie's "E" type ARC/ARCL Modules provide a convenient means of accomplishing these line matching requirements in a single modular component that can match multiple lines.

HYBRID IC
RC/C MODULES

muRata ERIE

ARC/CNT Series



These products represent our most standard Hybrid line. Consisting of standard Resistor/Capacitor network circuit configurations, the customer decides the individual component values. Once a customer determines the ideal values of capacitor and resistor, Murata Erie can provide these products in mass production quantities.

APPLICATION

- EDP/Computers
- Peripherals
- PBX/Telecommunications
- μP Control Modules
- Instrumentation

FOR PARTS NOT SHOWN ON PAGES 12 AND 13, PLEASE CLARIFY YOUR REQUIREMENTS BY USING REQUEST FORM ON PAGE 15.

FEATURES

- Excellent for decoupling, noise suppression and impedance matching requirements
- Simplifies board layout
- Reduces assembly time and costs
- Reduce board space compared to deceit components
- Advantages of surface mount without extra production costs associated with surface mount technology

PART NUMBERING

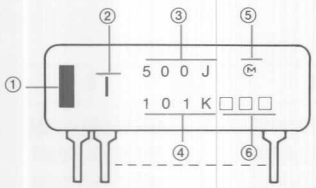
ARC	L	9	X	103J	101K	-	□
Murata RC-Module	L=Low Profile	Number of Pins	Circuit Type	Resistance Value and Tolerance 10,000 Ohm, ±5%	Capacitance Value and Tolerance 100pF C0G, ±10%		Special Specifications

PART NUMBERING

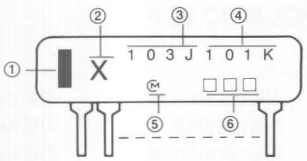
CNT	L	10	X	W	102M	-	□
C-Module	CNTL Series	Number of Pins	Type of Circuit	Lead Pitch: 2.5 mm	Capacitance Value and Tolerance		Special Specifications

MARKINGS

ARC



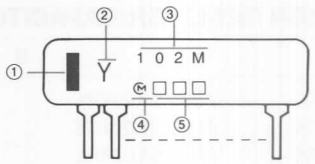
ARCL



① Marking at pin one.
② Circuit Type.
③ Resistance Value and Tolerance.
④ Capacitance Value and Tolerance.
⑤ Manufacturer's symbol.
⑥ Manufacturing lot No.

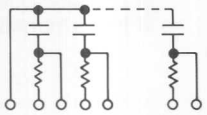
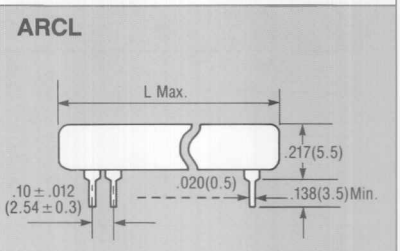
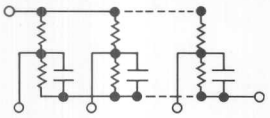
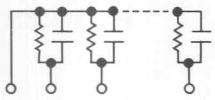
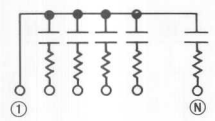
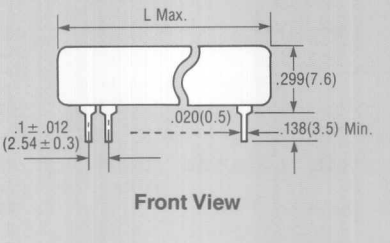
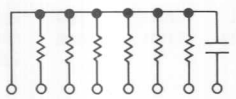
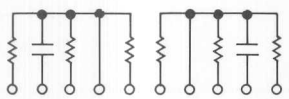
MARKINGS

CNTL



① Marking at pin one.
② Circuit Type . . . Y.
③ Capacitance Value and Tolerance.
④ Manufacturer's symbol.
⑤ Manufacturing lot No.

SPECIFICATIONS/ARC SERIES

Prefix	Circuit Type	Circuit	Configuration				Dimensions: in. (mm)
ARCL	L		Number of Pins		9		
			Number of Components	R	4		
				C	4		
			Length (mm)		.965 (24.5)		
ARCL	S		Number of Pins		6	10	
			Number of Components	R	4	8	
				C	4	8	
			Length (mm)		.689 (17.5)	1.083 (27.5)	
ARCL	X		Number of Pins		5	9	
			Number of Components	R	4	8	
				C	4	8	
			Length (mm)		.571 (14.5)	.965 (24.5)	
ARC	I		Number of Pins		10		
			Number of Components	R	9		
				C	9		
			Length (mm)		1.083 (27.5)		
ARC	8E		Number of Pins		8		
			Number of Components	R	6		
				C	1		
			Length (mm)		.866 (22)		
ARC	10E		Number of Pins		10		
			Number of Components	R	6		
				C	2		
			Length (mm)		1.063 (27)		

MOST COMMON RESISTOR/CAPACITOR MODULES: (ARCL/ARC SERIES)

L	S		X	I	E
ARCL9L471J101K	ARCL6S102J101K	ARCL10S103J470K	ARCL5X103J102M	ARC10I220J101K	ARC8E680J103M
ARCL9L471J471K	ARCL6S102J471K	ARCL10S103J101K	ARCL5X103J103M	ARC10I500J220K	ARC8E101J103M
ARCL9L102J101K	ARCL6S103J101K	ARCL10S103J471K	ARCL9X103J101K	ARC10I500J101K	ARC8E151J103M
ARCL9L102J471K	ARCL6S103J471K	ARCL10S103J102M	ARCL9X103J221K	ARC10I680J101K	ARC10E560J103M
	ARCL10S102J101K	ARCL10S473J470K	ARCL9X473J101K	ARC10I750J220K	ARC10E680J103M
	ARCL10S102J221K	ARCL10S473J101K	ARCL9X473J221K	ARC10I750J101K	ARC10E101J103M
Resistor	ARC =125mW per element, ±5%(J), 250ppm/°C ARCL=100mW per element, ±5%(J), 250ppm/°C				
Capacitor	C0G(K), X7R(M), Y5V(Z)				

For parts not shown, please clarify your requirements by using Request Form on page 15.

muRata ERiE

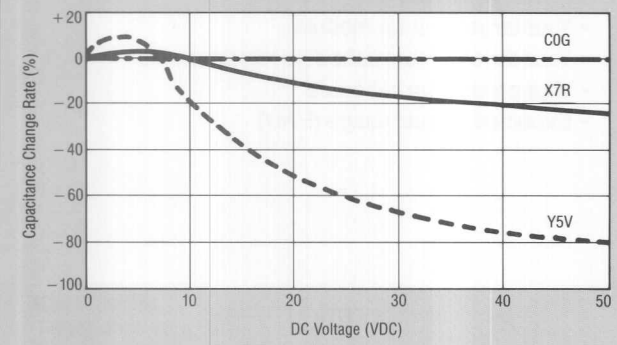
CNT Series

CNT SPECIFICATIONS & MOST AVAILABLE PART NUMBERS

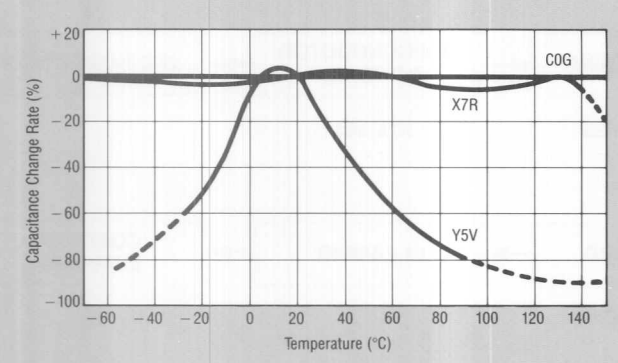
Capacitance /1 Element	Cap. Rating	Cap. Tol. (%)	Temp. Char.	Part Number	Part Number	Part Number	Part Number
47pF	50VDC	10	C0G	—	—	**CNTL9XW470K**	—
100pF	50VDC	10	C0G	**CNTL5XW101K**	**CNTL8XW101K**	**CNTL9XW101K**	**CNTL10XW101K**
470pF	50VDC	10	C0G	**CNTL5XW471K**	—	**CNTL9XW471K**	—
1000pF	50VDC	20	X7R	—	**CNTL8XW102M**	**CNTL9XW102M**	**CNTL10XW102M**
10000pF	25VDC	20	X7R	—	**CNTL8XW103M**	**CNTL9XW103M**	**CNTL10XW103M**
.01μF	25VDC	−20, +80	Y5V	—	**CNTL8XW104Z**	**CNTL9XW104Z**	**CNTL10XW104Z**
		# of Pins		5	8	9	10
		# of Elements		4	7	8	9
		Length: in. (mm)		.571 (14.5)	.866 (22.0)	.965 (24.5)	1.063 (27.0)
		Top.		−35°C to +85°C			
		Tstg.		−40°C to +85°C			

ELECTRICAL CHARACTERISTICS

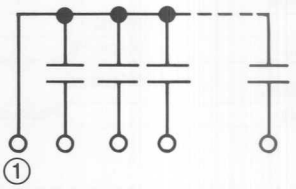
DC-Voltage Bias Characteristics



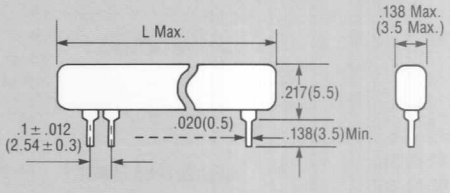
Capacitance-Temperature Characteristics



CIRCUIT



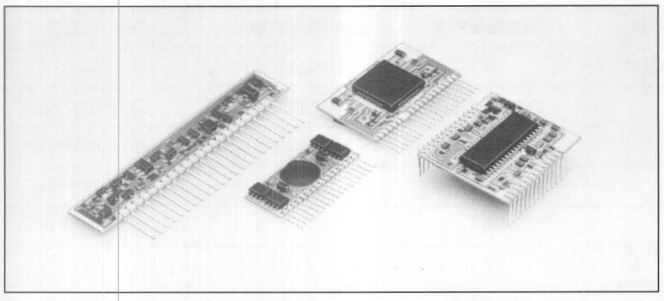
DIMENSIONS: in. (mm)



For parts not shown, please clarify your requirements by using Request Form on page 15.

HYBRID IC CUSTOM MODULES

For RC/C modules other than part numbers shown on pages 12-13, or custom designs including semiconductors, please complete the form on next page and contact Murata Erie Hybrid Design Group.



CUSTOM MODULES

Murata Erie offers custom Thick Film Hybrid Module design engineering and production capabilities. Our advanced computer aided design and manufacturing (CAD/CAM) systems allow us to respond to your various needs with quality and speed. If you have an application that could use our established Thick Film Technology, please contact us for engineering consultation.

Specifications	Resistor	Chip Monolithic Ceramic Capacitor
Resistance/ Capacitance Range	10Ω to 10Meg Ω	1pF to 1μF
Tolerance	±0.5% (Min.)	±1% (Min.)
TCR/TCC (Min.)	±100ppm/°C	±60ppm/°C
Rated Wattage/Voltage (Max.)	0.5W/Element	100VDC
Semiconductors	Please define	

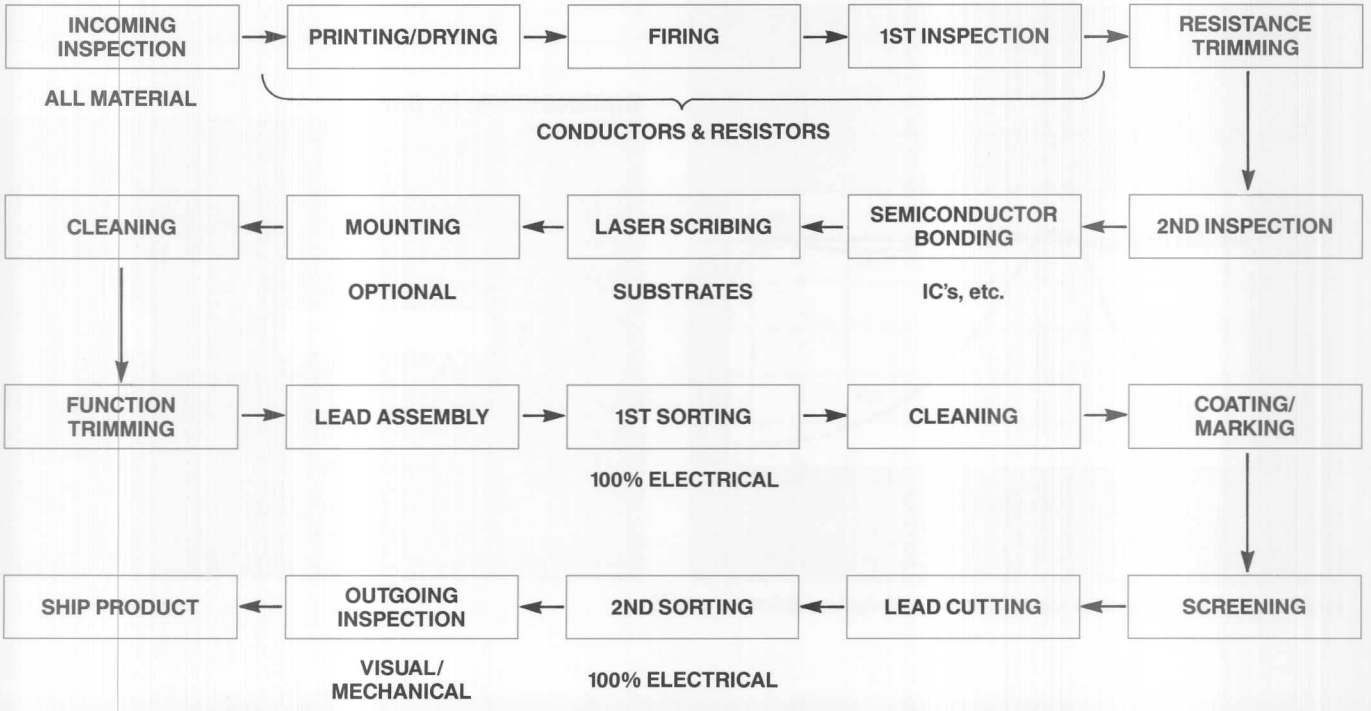
Murata Erie's Total Hybrid System is also prepared to accept customers' own proprietary circuit designs. A highly advanced Hybrid IC development and automated production system can help to greatly reduce lead time, increase quality, improve reliability, and maintain security of each customer's proprietary circuit design. An additional benefit is realized by the customer in increasing their assembly line efficiency, reducing component counts, overall design size and weight, and greatly reducing "time to market" cycle.

ORDERING INFORMATION

Please provide the following information when inquiring about custom modules:

- Functional description of circuit
- Application
- Resistor and capacitor values and tolerance
- Manufacturer and part number of all active devices (Semiconductors)
- Package type preferred (SIP or DIP)
- Package dimensions (L×W×H)
- Your target cost for module
- Your development schedule requirements
- Your production schedule
- Expected annual usage (EAU)

HYBRID IC PRODUCTION PROCESS (THICK FILM)



ARC/CNT SERIES & CUSTOM MODULES

TO: HYBRID IC DESIGN CENTER **FROM:**

Number of Pins . . . . . _____

Number of Elements . . . . . _____

Circuit Type . . . . . _____

C MODULE (CNTL SERIES)

X TYPE . . . . . _____

RC MODULE ARCL/ARC SERIES

	ARCL		ARC
X TYPE	_____	**I TYPE**	_____
L TYPE	_____	**8E TYPE**	_____
S TYPE	_____	**10E TYPE**	_____

OTHER

RESISTOR

Rating . . . . . ARC (Height: 7.6 mm) 125mW/Element _____ ARCL (Height: 5.5 mm) 100mW/Element _____

Resistance . . . . . _____ Ohm

Tolerance . . . . . ±5% (J) _____ Other _____

Temp. Characteristic . . . . ±250 ppm/C _____ Other _____

CAPACITOR

Rating . . . . . 50VDC _____ 25VDC _____ 16VDC _____

Capacitance . . . . . _____ F

Tolerance . . . . . ±10% (K) _____ ±20% (M) _____ +80/−20% (Z) _____

Temp. Characteristic . . . . COG* _____ X7R _____ Y5V _____

*Semiconductors/Other components (Please provide Part Numbers & Manufacturers)

_____

_____

APPLICATION (Market/Product/Function of Hybrid Design) _____

_____

_____

Potential (Annual Usage) . . . . . _____ K pcs/year

Schedule	Sample	Prototype	Mass Production
Quantity			
Date			

Please FAX to Murata Erie Hybrid IC Design Center 814-238-0490 or 814-237-2748

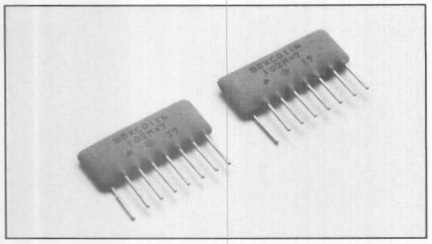
ENVIRONMENTAL SPECIFICATIONS

ARC AND CNT Series

Ta=25±2°C

<table>
<tr><th colspan="2">Test</th><th>Characteristics</th><th>Method of Test</th></tr>
<tr><td colspan="2">Resistance-Temperature Characteristics</td><td>Within ±250ppm/°C</td><td>Coefficient of Temperature-Resistance Coefficient Condition at test is calculated as follows. (Standard resistance is at 25°C) Coefficient of Temperature-Resistance Coefficient Condition (ppm/°C)
$=\frac{R-Ro}{Ro}\times\frac{1}{t-to}\times10^6$
R =Measured Resistance at t °C (Ω)
Ro=Measured Resistance at to°C (Ω)
T =Test Temp. (°C), to Temp. (25°C)
Test condition Temp. 25°C→−35°C→25°C→80°C</td></tr>
<tr><td colspan="2">Capacitance-Temperature Characteristics</td><td><table><tr><th>Char.</th><th>Temp. Characteristics</th></tr><tr><td>C0G</td><td>within ±60ppm/°C</td></tr><tr><td>X7R</td><td>within ±10%</td></tr><tr><td>Y5V</td><td>within +30%/−80%</td></tr></table></td><td>Temperature-Capacitance Coefficient at test temperature is calculated as follows. (Standard capacitance is at 20°C)
$C0G(ppm/°C)=\frac{C-Co}{Co}\times\frac{1}{t-to}\times10^6$
$X7R\cdot Y5V(\%)=\frac{C-Co}{Co}\times10^2$
C =Capacitance at any temp. for −35°C to +80°C
Co=Capacitance at standard temp. (20°C)</td></tr>
<tr><td colspan="2">Short-Time Impedance (Resistance)</td><td>Within △R/R: ±1%</td><td>Applied Voltage is 2.5 times the rated voltage for 5 seconds.
Rated Volt. (V)=
$\sqrt{\text{Nominal Resistance Value }(\Omega)\times\text{Rated Power (W)}}$
If applied rated voltage is over 100V, the rated voltage is said to be 100V and the maximum rated voltage is 200V.</td></tr>
<tr><td colspan="2">External High Voltage</td><td>Max. 10^4MΩ</td><td>The isolation resistance between all shorted terminals and the coating material is measured. (DC 100V: Applied for 1 minute)</td></tr>
<tr><td colspan="2">High Voltage</td><td>A shear fracture, damage by burning and dielectric breakdown does not occur.</td><td>AC 100V for 60^{+10}_{0} seconds applied and conditions described above.</td></tr>
<tr><td rowspan="2">Terminal</td><td>Strength</td><td>The terminal does not break.</td><td>A 500g load is applied in the lead direction of the terminal for 30 seconds.</td></tr>
<tr><td>Bending</td><td>The terminal does not break.</td><td>A 250g load is applied in the lead direction of the terminal. The device is bent 90 degrees to one side then reversed and bent 90 degrees in the opposite direction and then returned to the original position.</td></tr>
<tr><td colspan="2">Soldering Temperature Resistance</td><td>Change Ratio<table><tr><th>Resistance</th><th colspan="3">Capacitance</th></tr><tr><td rowspan="2">±0.5%</td><td>C0G</td><td>X7R</td><td>Y5V</td></tr><tr><td>±3%</td><td>±7.5%</td><td>±20%</td></tr></table></td><td>Measured after immersing sample 10±1 seconds in solder at 260±5°C, and leaving at room temperature for 2 hours.</td></tr>
<tr><td colspan="2">Solderability Test</td><td>The terminal should have solder coverage of more than 95%.</td><td>Measured in solder for 2±0.5 seconds, after immersed in isopropyl alcohol solution containing Rosin.</td></tr>
<tr><td colspan="2">Solution Proof</td><td>After cleaning products, some of the surface may have a whitish coloration.
(This has no effect on the specifications)</td><td>Washed for 5 minutes and treated with ultrasonics in Freon TE and Freon TES.</td></tr>
<tr><td colspan="2">Temperature Cycling</td><td>Change Ratio<table><tr><th>Resistance</th><th colspan="3">Capacitance</th></tr><tr><td rowspan="2">±0.5%</td><td>C0G</td><td>X7R</td><td>Y5V</td></tr><tr><td>±3%</td><td>±7.5%</td><td>±20%</td></tr></table></td><td>Measured after following temperature cycle 10 times and leaving the sample at room temperature for 2 hours.
 
</td></tr>
<tr><td colspan="2">Humidity Test</td><td>Change Ratio<table><tr><th>Resistance</th><th colspan="3">Capacitance</th></tr><tr><td rowspan="2">±1%
(1MΩ: ±3%)</td><td>C0G</td><td>X7R</td><td>Y5V</td></tr><tr><td>±5%</td><td>±12.5%</td><td>±30%</td></tr></table></td><td>At constant temperature and humidity of 60±2°C and 90% to 95% RH, apply current for 1.5 hours and then pause for 30 min. Repeat this cycle for 1000 hrs., leave for 24 hours exposure at room temperature, then measure.
Test Voltage (max. 50V) such that 1/5 Rated Pwr not exceeded (ARC)
Test Voltage (max. 50V) such that 1/4 Rated Pwr not exceeded (ARCL)</td></tr>
<tr><td colspan="2">High Temperature Test</td><td rowspan="2">Change Ratio<table><tr><th>Resistance</th><th colspan="3">Capacitance</th></tr><tr><td rowspan="2">±1%</td><td>C0G</td><td>X7R</td><td>Y5V</td></tr><tr><td>±5%</td><td>±12.5%</td><td>±30%</td></tr></table></td><td>Measured after 1000±12 hours exposure at the constant temperature of 85±2°C and then 3 hours exposure at room temperature.</td></tr>
<tr><td colspan="2">Low Temperature Test</td><td>Measured after 1000±12 hours exposure at constant temperature of −40±3°C and then 3 hours exposure at room temperature.</td></tr>
<tr><td colspan="2">Top</td><td>−35°C to +80°C</td><td></td></tr>
<tr><td colspan="2">Tsg</td><td>−40°C to +85°C</td><td></td></tr>
</table>

SIP
ECONOMY C-NETWORKS

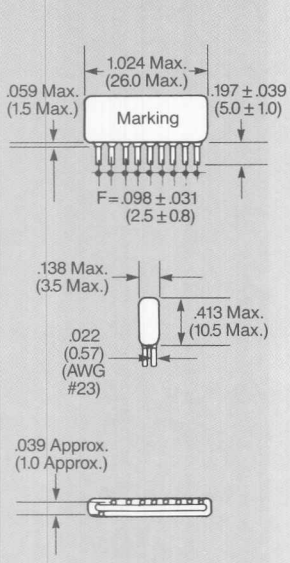
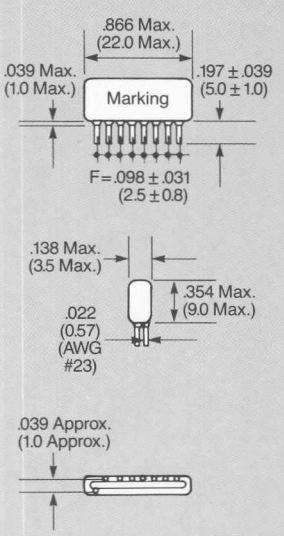
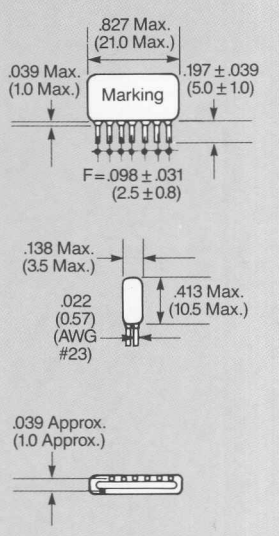
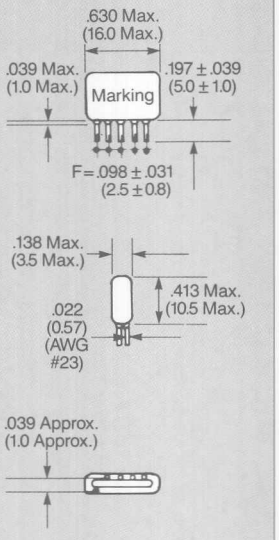
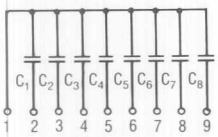
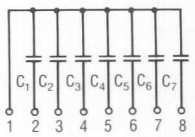
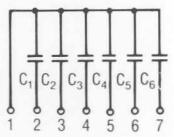
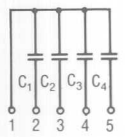


C-Networks are composed of several capacitors in parallel on a dielectric ceramic base plate. An excellent capacitance balance between elements has been achieved. Compared to conventional combination of capacitors and chip capacitors, C-Networks require less layout space making design and assembly easier.

FEATURES

- Small and easy handling.
- Excellent temperature characteristics.
- Less drift capacitance between elements.
- 50 VDC rated voltage.

RATINGS & DIMENSIONS: in. (mm)

Number of Elements	8	7	6	4
DIMENSIONS				
CIRCUIT				

Capacitance /1 Element	Part Number	Cap. Tol. (%)	Temp. Char.	Part Number	Cap. Tol. (%)	Temp. Char.	Part Number	Cap. Tol. (%)	Temp. Char.	Part Number	Cap. Tol. (%)	Temp. Char.
10000pF	—	—	—	—	—	—	**B7ZC0711-33N2**	$^{+80}_{-20}$	FZ*	**B5RC0127-33N2**	$^{+80}_{-20}$	FZ*
8200pF	—	—	—	**B8ZC0111-33N2**	$^{+80}_{-20}$	FZ*	—	—	—	—	—	—
4700pF	—	—	—	**B8XC0112-33N2**	$^{+80}_{-20}$	FZ*	**B7ZC0714-33N2**	$^{+80}_{-20}$	FZ*	**B5RC0126-33N2**	$^{+80}_{-20}$	FZ*
2200pF	**B9HC0113-33N2**	$^{+40}_{-20}$	Y5U	**B8XC0113-33N2**	$^{+40}_{-20}$	Y5U	**B7ZC0715-33N2**	±20	Y5T	**B5RC0125-33N2**	±20	Y5T
1000pF	**B9HC0114-33N2**	±20	Y5P	**B8XC0114-33N2**	±20	Y5P	**B7ZC0716-33N2**	±20	Y5P	**B5RC0124-33N2**	±20	Y5P
560pF	**B9HC0116-33N2**	±20	Y5P	**B8XC0115-33N2**	±20	Y5P	**B7ZC0718-33N2**	±20	Y5P	**B5RC0135-33N2**	±20	Y5P
470pF	**B9HC0115-33N2**	±20	Y5P	**B8XC0119-33N2**	±20	Y5P	**B7ZC0717-33N2**	±20	Y5P	**B5RC0123-33N2**	±20	Y5P
330pF	**B9HC0119-33N2**	±20	Y5P	**B8XC0116-33N2**	±20	Y5P	**B7ZC0719-33N2**	±20	Y5P	**B5RC0122-33N2**	±20	Y5P
220pF	**B9HC0117-33N2**	±10	Y5P	**B8XC0117-33N2**	±10	Y5P	**B7ZC0713-33N2**	±10	Y5P	**B5RC0128-33N2**	±10	Y5P
100pF	**B9HC0118-33N2**	±10	Y5P	**B8XC0118-33N2**	±10	Y5P	**B7ZC0720-33N2**	±10	Y5P	**B5RC0129-33N2**	±10	Y5P

*FZ: Operating temperature range: −10°C to +60°C; Capacitance change over temperature range: +30% to −85%